Investigating Grade Five Teachers' Integration of Technology in Teaching Reading Comprehension Using the TPACK Framework

Nurwahidah Nurwahidah
Elementary Education Department, Universitas Muhammadiyah Makassar, Makassar, Indonesia

Sulfasyah Sulfasyah
Elementary Education Department, Universitas Muhammadiyah Makassar, Makassar, Indonesia

Rukli Rukli
Elementary Education Department, Universitas Muhammadiyah Makassar, Makassar, Indonesia

Abstract—Integrating technology effectively in the classroom is essential to ensure a beneficial learning experience for students. This study aimed to investigate teachers' integration of technology when teaching reading comprehension and the factors influencing their integration. The teachers' technology integration was assessed using the TPACK framework's lens. The research method used was a qualitative approach. In this study, two fifth-grade teachers in Barru Regency, South Sulawesi Province, Indonesia, became the research subjects. The data was collected by class observation, interview, and document analysis. The study found that teachers in this study mostly used PowerPoint presentations using a laptop and LCD when teaching reading comprehension. It was used primarily to show the lesson's objectives to be studied and reading texts to be read by students. This study indicated that their technology integration was influenced by how they view technology as a means to make teaching easier, combined with their limited strategies for teaching reading comprehension. The findings suggest teachers need support in understanding and implementing the TPACK framework to assist them in integrating technology into their lessons to provide learning experiences for students, particularly in reading comprehension.

Index Terms—competence, fifth grade teacher, reading comprehension, TPACK

I. INTRODUCTION

The challenges faced in the 21st century are complex, unknown, and unpredictable. One of the efforts teachers can make to prepare students to face the challenges of the 21st century is through learning that utilizes technology. The use of technology in teaching has many benefits. Technology encourages teachers to develop creative and interactive classrooms and gives them access to innovative resources. The use of technology in teaching also helps teachers teach effectively, makes students' learning experiences more enjoyable, designs exciting materials, and encourages teachers to upgrade their computer knowledge and skills.

Teachers must be able to choose the right technology with learning materials and strategies to promote students' learning. The integration of these three aspects is known as the Technological Pedagogical Content Knowledge framework, abbreviated as TPACK (Koehler & Mishra, 2005; Mishra & Koehler, 2006; Lin et al., 2013; Ariani, 2015; Taopan et al., 2020).

One of the most important ways to support technology integration in learning is to use the TPACK framework (Angeli & Valanides, 2005; Ariani, 2015; Taopan et al., 2020). The TPACK framework is a framework that integrates technological knowledge, pedagogical knowledge, and content knowledge in a learning context. In this case, technological knowledge refers to teachers using technology as a teaching and learning tool. Pedagogical knowledge is related to how teachers teach learning materials using appropriate and effective models and methods to promote effective learning. Knowledge content is the material to be taught (Schmidt et al., 2009; Koehler et al., 2014; Taopan et al., 2020).

Using the TPACK framework in education can improve the conditions of learning activities (Malik et al., 2019; Oyanagi & Satake, 2019; Salas, 2019). The TPACK framework guides teachers to develop innovation in learning (Malik et al., 2019; Salas, 2019) and makes learning more effective and efficient. It shows that TPACK is an essential element that can be used as a reference for improving learning and for evaluating the quality of education.

The TPACK framework is considered a relatively new thing in the world of education in Indonesia, especially related to teaching reading comprehension in elementary schools. The literature review and empirical studies show that few studies review the TPACK framework concerning the reading subject, which is one of the core subjects in elementary school. Therefore, research is needed on integrating TPACK into reading comprehension in elementary schools. In

particular, this study aims to describe how teachers integrate pedagogical and content knowledge using technology when teaching reading comprehension and analyzes the influencing factors.

The research results are expected to provide input to stakeholders regarding teachers' TPACK knowledge, which impacts policy review regarding teachers' professional development. It is an effort to improve Indonesian students' reading comprehension skills, which still need to be optimal based on the results of the PISA Test and other evaluations (Basuki, 2011; Ambarita et al., 2021).

II. REVIEW OF RELATED LITERATURE

A. TPACK History

TPACK is a combination of content, pedagogy, and technology knowledge. Teachers should have this knowledge in order to integrate technology effectively (Harris et al., 2014; Schmidt et al., 2009; Koehler et al., 2014; Malik et al., 2019). These three types of knowledge interact in a dynamic transactional relationship to produce effective teaching (Harris et al, 2014; Schmidt et al., 2009; Koehler et al., 2014).

The idea of TPACK first appeared in educational journals around 2003 and began to be publicly discussed around 2005. At first, TPACK was written TPCK, then it was changed to TPACK to make it easier to pronounce (tee-pack) (Chai et al., 2013). The TPACK framework was developed by Mishra and Koehler based on Lee Shulman's 1986 Pedagogical Content Knowledge (PCK) concept by adding technology knowledge. The TPACK framework is formed from 7 (seven) elements of knowledge. They are:

1) Content Knowledge (CK). It is an understanding of the actual subject matter that must be taught, including key facts, concepts, theories, and procedures;
2) Pedagogical Knowledge refers to an understanding of the process and practice of teaching methods, classroom management, development and implementation of lesson plans, understanding of learning theory, and cognitive development;
3) Pedagogical Content Knowledge. It is an understanding of content-appropriate teaching approaches and how elements of content can be styled for better teaching;
4) Technology Knowledge refers to an understanding of standard technology and more advanced technologies such as digital technology;
5) Technological Content Knowledge. It is an understanding of how technology and content are intertwined. Besides mastering the material being taught, the teacher also teaches how to apply technology;
6) Technological Pedagogical Knowledge. It is an understanding of the existence, components, and capabilities of various technologies used in learning settings, of how learning can turn into a result of technology utilization;
7) Technological Pedagogical Content Knowledge. It is an understanding that arises from complex interactions between the three components of basic Knowledge (content, pedagogy, and technology) and is integrated effectively into teaching and learning activities (Mishra & Koehler, 2006; Schmidt et al., 2009).

B. The Benefits of TPACK in Reading Classroom

Reading comprehension is a person's ability to reconstruct the message in the text read by connecting the knowledge possessed to understand the main idea and important details and all understanding and remembering the material read (Kucukoglu, 2013; Sulikhah et al., 2020). Reading comprehension is a continuation of silent reading, where these activities begin to be given in grade 3 in the Indonesian context (Sulikhah et al., 2020). Reading comprehension primarily starts in grade 3 with standardized competence in understanding texts, essential competencies in intensive reading of texts (100-150 words), and retelling the contents (Sulikhah et al., 2020). The higher the class level, the more complex the child's understanding is required in reading (Basuki, 2011; Sulikhah et al., 2020). Reading in upper grades is not just about voicing the sounds of language or difficult words in a reading text but also involves understanding what one reads, what it means, and what the implications are (Basuki, 2011; Sulikhah et al., 2020).

The ability of teachers to integrate information and communication technology (ICT) in 21st-century learning is crucial. Using the TPACK framework opens up opportunities for teachers to develop innovation in learning (Chai et al., 2013; Oyanagi & Satake, 2019; Taopan et al., 2020). Integrating ICT and appropriate pedagogy for certain content can increase effectiveness while overcoming student learning problems, especially in reading comprehension.

Using TPACK in learning reading comprehension can improve the conditions of learning reading comprehension activities (Salas, 2019). TPACK makes learning more effective and efficient because of the integration of technology into learning. It shows that TPACK can be used as a reference to improve learning to read and as a material for evaluating the quality of education (Shulman, 1986).

Using technology in the learning process increases students' attention, concentration, motivation, and independence. While for teachers, using technology reduces the use of time for delivering material, makes student learning experiences more enjoyable, designs material more interesting, and encourages teachers to improve their knowledge and skills about computers (Nasution, 2018).

III. METHODS

This study aimed to describe teachers' integration of technology when teaching reading comprehension and the factors influencing their integration. This study used a qualitative research design to describe the technology integration of fifth-grade teachers in reading comprehension using the TPACK Framework. The subjects of the qualitative data research were two fifth-grade teachers from two schools in Barru District, South Sulawesi Province, Indonesia. The teachers were selected from 50 fifth-grade teachers who had previously participated in the quantitative research that preceded this qualitative study. The two teachers were selected using purposive sampling based on questionnaire responses in the initial study. The researcher chose one subject with TPACK knowledge in the top category at the top margin and one in the medium category at the bottom margin because there were no subjects in the low category. The two teachers are women aged 32 and 35 years. Both have taught for 12 and 7 years in elementary schools.

Qualitative data collection was carried out through class observations and semi-structured interviews. In addition, the observed class lesson plans were also analyzed to obtain additional evidence regarding the teacher's technology integration. Class observations were carried out three times for each teacher in which the researcher acted as a non-participant observer. Each observation was carried out for 80 minutes using an observation protocol modified based on the TPACK categories (Valtonen, 2005; Schmidt et al., 2009; Muhaimin et al., 2019) to meet the aims of this study. After the observation was completed, further data collection was carried out through semi-structured interviews. This interview aimed to confirm the observations' results and explore teachers' TPACK. The results of the interview were transcribed before being analyzed. To obtain additional data related to the implementation of the teacher's TPACK, the researcher also analyzed the teachers' lesson plans for the practical lessons.

All the qualitative data collected was organized and analyzed using interactive model techniques, including data reduction, data presentation, and data verification to identify general categories and themes (Miles & Huberman, 1994). The researchers used a triangulation technique and member checking to ensure the validity and accuracy of the data obtained (Cresswell, 2012). The researchers did the triangulation by comparing observational data with interview data, reinforced by a document analysis of the teachers' lesson plans. Member checking was conducted by asking the teachers to check a summary of the findings to see if the findings echoed their opinions and whether the interpretation was just and representative. All reported that both the findings and interpretation were appropriate to their situation.

IV. FINDINGS

As explained earlier in the methods section, the researcher selected two out of 50 grade 5 teachers who participated in the quantitative study that preceded this qualitative study. The researcher chose one subject with high-category TPACK knowledge at the top margin (named ST in this study) and one in the medium category at the bottom margin because there were no subjects in the low category (SR). Observations and the interviews were conducted in the second and third week of April 2022. The following is a presentation of the research findings.

A. Types of Technology Used by Teachers in Teaching Reading Comprehension Lessons

The study found that the dominant type of technology used by the teacher when teaching reading comprehension was the LCD to display the PPT prepared by the teacher. The results of observations three times in each class showed the use of PPT using a laptop connected to the LCD.

Besides the use of PPT and LCD, ST also used learning videos in one of her lessons, as conveyed by ST during the interview below:

> Besides using PowerPoint, I also use video in learning… I also use other technologies,
> but the one I often use is PowerPoint.

When asked why she mainly used PowerPoint, LCD, and video, she explained that they were available, easy to use, and did not depend on the internet connection. SR explained:

> We do not have an internet connection in our school. So, at home, I download materials
> or videos, save them on my laptop, and show the materials to students using the LCD at school.

In the interview, the two teachers also stated that they used other technologies such as WhatsApp, google classroom, zoom, and google meet. However, they only used these platforms for online classes when schools were closed due to the pandemic, during which the internet was made available in school. ST stated:

> I still use WA at the moment when I have something to convey to students who are at home through the WA
> Group…I only use Google Classroom, Zoom, and Google Meet during online classes.

B. The Integration of Technology in Reading Comprehension Lessons

Regarding integrating technology in the classroom, the study found that teachers had similarities in practice. The observation results, supported by document analysis results, showed that teachers used PPT to explain learning objectives and to present reading material taken from a textbook for grade five. Next, the teacher asked students to read the material displayed on the LCD. When finished, the teacher asked students to answer comprehension questions according to the content of the reading. In the interview, ST stated:

> I use PPT to show the reading material...
> ..I make the PPT by myself. I take a reading text from a textbook for grade five.

Likewise, SR used technology in learning by displaying reading text or reading comprehension materials downloaded from home using PPT with LCD media and then asked students to read the material silently and repeatedly. SR stated:

> Through PPT, I explain to students that to understand the contents of the reading, students must
> focus on what is read, and read the reading silently over and over again.

ST also displayed learning videos pre-saved from YouTube using LCD in one of her observed lesson to show content related to the learning objectives. She played a video that showed students how to determine the main ideas of a paragraph and make a mind mapping.

> ST explained:
> I also used video in my lessons. I download it from YouTube and use LCD in the class.

C. Factors Influencing the Teachers' Technology Integration in Reading Comprehension Lessons

As stated in points a and b above, both teachers mainly used PPT and LCD-using laptops during observations. The teachers used the PPT and LCD to display learning objectives and reading materials and then asked students to read the materials. The teachers also used learning videos from YouTube about reading materials.

Based on the classroom observations and interviews, this study suggested that factors that influenced how teachers integrate technology into reading comprehension lessons are 1) Availability and utility of PPT and LCD in schools; 2) Teachers' perceptions of the use of technology in the class; and 3) Teachers' teaching methods in reading comprehension. Here is the explanation:

(a). Availability and Utility of PPT and LCD

Teachers used PPT and LCD because these media do not require an internet network, so they considered these practical and easier for teachers. SR, for example, explained:

> In our school, we do not have an internet network. Therefore, most teachers
> download learning resources at home and then at school use the LCD to display the reading material.
> With the laptop, I look for learning materials online and display them to students via LCD.
> Teachers were also capable of using PPT to some extent. ST stated:
> I design the PPT, and for the videos, I download them from YouTube.
> Similarly, SR said:
> Teachers could use PPT and LCD and prepare their materials through PPT.

(b). Teacher's Perception of the Use of Technology in the Classroom

This study indicated that another factor that affected the integration of teachers' technology in this study was the teacher's perception of the use of technology in learning. Teachers thought that the primary use of technology was to facilitate their tasks in teaching and preparing administration. SR, for example, stated:

> Using PowerPoint makes teaching easier; teachers do not have to rewrite the material.
> ST stated the same thing:
> PPT makes it easier for me in learning activities…
> When giving the material, you need to show the PPT or videos; you don't need to write on the blackboard
> anymore.

The use of technology was also considered to facilitate the administrative tasks of teachers. ST stated:

> Using a laptop makes it easy for me to input student grades; I no longer write the report manually,
> but type them on a laptop and then print them out.

The teachers' statements above showed that the use of technology seems to be more on making it easier for teachers to teach, not to help achieve learning objectives.

(c). The Way Teachers Teach Reading Comprehension

The way teachers taught reading comprehension lessons also appeared to affect their technology integration. Teachers' methods and activities given to students were deemed compatible with PPT and LCD. The results of observations, which were supported by analysis of lesson plans, showed that in teaching reading comprehension, the teachers used PPT to present the material to be learned. For example, SR taught reading comprehension lessons by giving reading texts through PPT media, directing students to read, and answering comprehension questions. Last, she asked students to retell the contents of the reading that had been read.

ST did things that seemed similar. ST taught reading comprehension material by providing reading text through PPT media, then directing students to read and training students according to the indicators of reading comprehension being taught, for example, by asking questions. When using videos, ST asked students to watch, and after that, students answered reading comprehension questions.

In teaching students with different reading abilities, both teachers used learning strategies such as implementing cooperative learning or group work so that students with higher abilities could communicate their abilities to students with lower abilities. The role of technology, namely PPT and LCD, in these strategies was to become a medium to display the learning objectives and reading material.

V. DISCUSSION

The teachers involved in this study had completed a questionnaire that assessed their TPACK knowledge prior to this study. The questionnaire analysis showed that their TPACK knowledge fell into a good category. However, little evidence was found in this study through the observation, interview, and document analysis that suggest teachers had a good understanding of TPACK. The study found that the teachers' integration of technology when teaching reading comprehension was inconsistent with the TPACK framework. The types of technology teachers primarily used in their class were PowerPoint presentations using a laptop and LCD. The teachers used these to introduce the outcomes of the lesson and to show the reading text that students were about to read.

Some factors were identified that seemingly influenced teachers' integration of technology, such as using the available technology, like a laptop, PowerPoint, and LCD. Another factor was such as teachers' perception of the integration of technology. The teachers in this study considered that using technology makes teaching less difficult regarding physical aspects. They spent less time writing the material on the board as they showed them through the PPT application. Little evidence shows that teachers use technology to provide meaningful learning experiences or make teaching effective to help students achieve learning outcomes.

In addition, teachers' strategies in reading comprehension also seemed to influence teachers' lack of ideas to create meaningful activities or tasks using technology. The teachings appeared to lack variety. Students were mostly asked to read a reading text either silently or loudly. The finding was in line with previous studies that showed various issues related to teachers' integration of technology in their classrooms, such as IT competence, internet connection availability, and lack of ideas to produce meaningful tasks using technology (Taopan et al., 2020).

Integrating technology in the classroom requires teachers to have specific knowledge, such as technological, pedagogical, and content knowledge, to effectively provide learning experiences for students (Angeli & Valanides, 2005; Mishra & Koehler, 2006; Lin et al., 2013; Taopan et al., 2020). However, this did not seem to be the case in this study. Therefore, providing training based on the TPACK framework would assist teachers in integrating technologies into their lessons to promote students' learning (Angeli & Valanides, 2005; Mishra & Koehler, 2006; Lin et al., 2013; Taopan et al., 2020).

VI. CONCLUSIONS

Despite teachers' self-assessment to have a good understanding of TPACK, the study suggested that the teachers' integration of technology when teaching reading comprehension was inconsistent with the TPACK framework. Teachers' use of technology was primarily to present learning objectives and materials. Teachers' view of technology as a means to make teaching more manageable and their limited strategies for teaching reading comprehension were among the factors that seemed to influence their technology integration when teaching. The findings revealed the need for teachers to have support in understanding and implementing the TPACK framework effectively, as it could assist teachers in using technologies to effectively provide learning experiences for students, particularly in reading comprehension lessons. However, this study has limitations regarding fieldwork, the number of participants, and different viewpoints. Therefore, future research may involve more participants and exploration to present various stories better to depict and understand teachers' technology integration in their classrooms.

ACKNOWLEDGEMENTS

REFERENCES

[1] Ambarita, R. S., Wulan, N. S., & Wahyudin, D. (2021). Analisis kemampuan membaca pemahaman pada siswa sekolah dasar [Analysis of reading comprehension ability in elementary school students]. *Edukatif : Jurnal Ilmu Pendidikan, 3*(5), 2336-2344.
[2] Angeli, C., & Valanides, N. (2005). Preservice elementary teachers as information and communication technology designers: An instructional systems design model based on an expanded view of pedagogical content knowledge. *Journal of Computer Assisted Learning, 21*(4), 292-302. https://doi.org/10.1111/j.1365- 2729.2005.00135.
[3] Ariani, D. N. (2015). Hubungan antara technological pedagogical content knowledge dengan technology integration dan self-efficacy guru matematika di sekolah dasar [Relationship among technological pedagogical content knowledge, technology integration and self-efficacy of mathematics teachers in elementary schools]. *Muallimuna, 1*(1), 79-91.
[4] Basuki, I. A. (2011). Kemampuan membaca pemahaman siswa Kelas IV SD berdasarkan Tes Internasional dan Tes Lokal [Reading comprehension ability of Grade-Fourth students based on International and Local Tests]. *Jurnal Bahasa, Sastra, Seni dan Pengajarannya, 39*(2), 202-212.
[5] Chai, C.-S., Koh, J. H.-L., & Tsai, C.-C. (2013). A review of Technological Pedagogical Content Knowledge. *Educational Technology & Society, 16*(2), 31-51.
[6] Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson.

[7] Harris, J., Misra, P., & Koehler, M. (2014). Teachers' Technological Pedagogical Content Knowledge and learning activity types: 36 Curriculum-based technology integration reframed. *Journal of Research on Technology in Education*, *41*(4), 393-416.

[8] Koehler, M. J., & Mishra, P. (2005). What happens when teachers design educational technology? The development of technological pedagogical content knowledge. *Journal of Educational Computing Research*, *32*(2), 131-152.

[9] Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2014). The technological pedagogical content knowledge framework. In *Handbook of Research on Educational Communications and Technology*: *Fourth Edition* (pp. 101-111). Springer New York. https://doi.org/10.1007/978-1-4614-3185-5_9.

[10] Küçükoğlu, H. (2013). Improving reading skills through effective reading strategies. *Procedia - Social and Behavioral Sciences*, *70*, pp. 709-714.

[11] Lin, T. C., Tsai, C. C., Chai, C. S., & Lee, M. H. (2013). Identifying science teachers' perceptions of Technological Pedagogical and Content Knowledge (TPACK). *Journal of Science Education and Technology*, *22*(3), 325-336. https://doi.org/10.1007/s10956-012-9396-6.

[12] Malik, S., Rohendi, D., & Widiaty. (2019). Technological Pedagogical Content Knowledge (TPACK) with Information and Communication Technology (ICT) integration : A literature review. *Advances in Social Science, Education and Humanities Research*, *299*, 498-503.

[13] Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

[14] Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A framework for integrating technology in teachers' knowledge. *Teachers College Record*, *108*(6), 1017-1054.

[15] Muhaimin, M., Habibi, A., Mukminin, A., Saudagar, F., Pratama, R., Wahyuni, S.,et al. (2019). A sequential explanatory investigation of TPACK: Indonesian science teachers' survey and perspective. *Journal of Technology and Science Education*. *9*(3), 269-281. https://doi.org/10.3926/jotse.662.

[16] Nasution, S.H., (2018). Pentingnya literasi teknologi bagi mahasiswa calon guru Matematika [The importance of technology literacy for pre-service Mathematic teachers]. *JKPM: Jurnal Kajian Pembelajaran Matematika*, *2*(1), 14-18.

[17] Oyanagi, W. & Satake, Y. (2019). Capacity building in Technological Pedagogical Content Knowledge for pre-service teacher. *International Journal for Educational Media and Technology*, *10*(1), 33-44.

[18] Salas-Rueda, R.A. (2019). TPACK: Technological, Pedagogical and Content Model necessary to improve the educational process on Mathematics through a web application. *International Electronic Journal of Mathematics Education*, *15*(1), 1-13.

[19] Schmidt, D.A., Baran, E., Thompson, A.D., Mishra, P., Koehler, M.J., & Shin, T.S. (2009). Technological Pedagogical Content Knowledge (TPACK). *Journal of Research on Technology in Education*, *42*(2), 123-149, DOI: 10.1080/15391523.2009.10782544.

[20] Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(1), 4-14.

[21] Sulikhah, Utomo, S., & Santoso. (2020). Pengaruh Teknik Survey Question Read Reflect Recite Review (SQ4R) dan Teknik Skema terhadap kemampuan membaca pemahaman mata pelajaran bahasa Indonesia pada siswa SD Negeri Kelas III di Kecamatan Karanganyar Demak [The influence of Question Read Reflect Recite Review (SQ4R) Survey Technique and Schemata Technique on reading comprehension ability in Indonesian subjects of Grade-Third public elementary school students in Karanganyar District, Demak]. *KREDO : Jurnal Ilmiah Bahasa dan Sastra*, *3*(2), 365-385.

[22] Taopan, L.L., Drajati, N.A., & Sumardi. (2020). TPACK framework: Challenges and opportunities in EFL classrooms. *Research and Innovation in Language Learning*, *3*(1), 1-22.

[23] Valtonen, T. S. E. (2005). Developing a TPACK measurement instrument for 21st century pre-service teachers. *International Journal of Media, Technology and Life Long Learning*, *11*(2), 87-100.

Nurwahidah is currently undertaking her master's degree in Elementary Education at Graduate Study Program, Universitas Muhammadiyah Makassar, Makassar, Indonesia. She teaches grade five students at an elementary school in Barru Regency, South Sulawesi Province. Her main areas of interest are reading and writing in elementary school.

Sulfasyah Sulfasyah obtained her PhD in Education from the School of Education, Edith Cowan University, Perth, Western Australia, in 2013. She teaches Literacy and Curriculum at Elementary Education Department, Graduate Study Program, Universitas Muhammadiyah Makassar, Makassar, Indonesia. Her research interest includes literacy development, curriculum and language teaching in elementary school.

Rukli Rukli received an M.Pd degree in Science Research and Educational Evaluation with a concentration in Measurement from the State University of Yogyakarta, Indonesia, in 1998. He obtained an M.Cs, a degree in computer science from Gadjah Mada University, Indonesia, in 2010, and a PhD in Research and Educational Evaluation with a concentration in Measurement from Yogyakarta State University, Indonesia, in 2012. He is currently a permanent lecturer in the Mathematics Education Study Program at Universitas Muhammadiyah Makassar, Indonesia. He teaches Mathematics, Computer Programming, Artificial Neural Network, Statistics, Fuzzy, and Educational Evaluation. He has published several papers in journals on educational evaluation in computers, expert systems related to mathematics education, and educational evaluation. His current research interest is computer adaptive using fuzzy methods in education.